Microbiology

A department in the College of Natural Sciences offering the B.A., B.S., M.S., and Ph.D. degrees in Microbiology.

The Review Process

This was a standard AQAD review. Reviewers were:

Dr. Sandra Weller, University of Connecticut Health Center
Dr. Max Haggblom, Rutgers, the State University of New Jersey
Dr. Piet de Boer, Case Western Reserve University School of Medicine

Main Issues

The report described a department that remains vital to the campus, the region, and beyond, building on a long history of attracting strong students at both the undergraduate and graduate levels—students who have largely gone on to productive careers in areas related to microbiology. The reviewers unanimously concluded that the department’s new leadership has succeeded in the continuing fulfillment of its research, education, and outreach missions. The undergraduate program has grown considerably, graduating an average of 60 students each year. Undergraduate curriculum has been revised and revamped in recent years, and the co-teaching model that department leadership has undertaken has been effective. The new Applied Molecular Biotechnology masters degree program is providing an important service to the state by training students for careers in biotechnology and pharmaceutical industries. The department has an excellent reputation among biotech and academic labs looking for well-trained students. Partnerships with the UMass Medical School in Worcester are expected to play an increasing role in the development of the program at UMass Amherst in the fields of genomic and bioinformatics analysis, metabolomics, proteomics, and biosynthetics—all of which play an increased role in microbial studies.

The Department of Microbiology at UMass Amherst comprises four areas of focus: environmental microbiology and microbial biofuels, molecular and cellular biology, medical microbiology, and genomics and systems biology. The reviewers noted that this diversity presents challenges along with its opportunities. During the review process, some faculty and students emphasized the differences between environmental and medical microbiology and cited divisions within the department. Students noted lack of participation among faculty with regard to events outside of members’ specialized areas. The reviewers noted the department’s facilities as an area of specific concern. Currently, the department is spread among three buildings, and the variation in quality between research spaces is extreme. While the new facilities in Life Science Building I are stellar, the poor quality of laboratories in Morrill and Fernald Hall present difficulties in the recruitment, retention, and morale of faculty, postdoctoral fellows, and students.

The reviewers offered a number of recommendations:
The team noted that if the department is to thrive, it must embrace its intellectual diversity, making strong connections across areas of focus. This effort must be led by the department head and faculty. The team recommended that faculty be more strongly encouraged to attend student and outside seminars and consider the formation of common journal clubs spanning all areas of the department. Continuing with the theme of bridging the gap across areas of focus, the team recommended co-teaching partnerships that would pair faculty from various areas of focus within the department.

The department needs more capacity, both in terms of faculty and research space. The existing limited capacity has limited opportunities for undergraduate research and the type of experiments that may be performed.

At the graduate level, there have been discussions regarding the viability of an independent graduate program in microbiology. Other programs in the College of Natural Sciences have pursued an integrated approach. In light of the difficulties that the program faces independently, the team recommended considering two other options: that the independent program in microbiology disband and the faculty join the programs in Molecular and Cellular Biology and Organismal and Evolutionary Biology, or the formation of an integrative University-wide graduate program.

Clarity is needed regarding the graduate curriculum. Many master’s students expressed confusion regarding their course and research requirements, and all students would benefit from increased mentoring. Difficulties regarding the accessibility of the Graduate Program Director have exacerbated confusion, and an Associate Director may be necessary.

The team recommended expansion in the area of medical microbiology.

In light of difficulties funding research, additional revenue sources must be explored.

The faculty suffers from a gender imbalance, and the team recommends taking this into consideration during subsequent searches.

In regards to facilities, research and teaching laboratory space in Morrill needs renovation. Additionally, the faculty currently housed in Fernald need to be accommodated in Morrill or Life Science Building I.

### Results of the Review

The Department of Microbiology discussed the report of the external reviewers and offered a number of responses and recommendations. The Dean of the College of Natural Sciences in turn reviewed the responses of the department, and voiced support.

The renovation of facilities is a top priority of the department. The condition of facilities is viewed as particularly embarrassing because it was described at length in the 2005 AQAD review.

The department finds the underrepresentation of women among tenure track faculty unacceptable. The ability to make progress in this area is limited in a small department with little turnover, but future hiring plans will address this issue. The department has hired one female faculty member in three searches over the past six years.

The department is considering options for improving graduate education. Changes are being made to the graduate handbook, with input from students. The department recognizes the difficulty of maintaining an independent graduate program and is weighing options that include the formation of an Integrative Microbiology Graduate Program with a faculty base that would be extended via the inclusion of faculty from other departments and schools. The department agreed that increased enthusiasm must be shown for the five-year masters program, and it will work to that end.
Outcomes Assessment

The Department of Microbiology has an established set of student learning objectives for the undergraduate major. The department uses a series of measures to determine if these learning outcomes are being met including faculty committee review of poster presentations of independent study projects, evaluation of a special Junior Year Writing course by a faculty member who is not the instructor, and evaluation of undergraduate preparation for graduate studies via an examination of student performance in the accelerated masters program. Additionally, the department has solicited group feedback from industry partners.